

3.4.2 Explain the significance of complementary base pairing in the conservation of the base sequence of DNA.	<p>State the base pairing rules.</p> <p>Explain why the base pairing rules are important during DNA replication.</p>
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3.5 Transcription and translation

Assessment Statement	Study information
3.5.1 Compare the structure of RNA and DNA.	Using a diagram, compare the structure of an RNA and DNA nucleotide.
3.5.2 Outline DNA transcription in terms of the formation of an RNA strand complementary to the DNA strand by RNA polymerase.	Explain the steps of transcription. Be sure to include the following words: mRNA, template, RNA polymerase, nucleus, and complementary base pairing.
3.5.3 Describe the genetic code in terms of codons composed of triplets of bases.	<p>How many mRNA bases are in a codon?</p> <p>What does a codon code for?</p>

3.5.4 Explain the process of translation, leading to polypeptide formation.	Explain the process of translation. Be sure to include the following words: Small ribosomal subunit, mRNA, codon, tRNA, anticodon, large ribosomal subunit, E-site, P-site, A-site, and release factor. A diagram may help.
3.5.5 Discuss the relationship between one gene and one polypeptide.	One gene <u>usually</u> codes for _____ polypeptide. Explain why <u>usually</u> is underlined.

4.1 Chromosomes, genes, alleles and mutations

Assessment Statement	Study Information
4.1.1 State that eukaryote chromosomes are made of DNA and proteins.	Explain the role of histones and state their molecular composition (what they're made out of).
4.1.2 Define gene, allele and genome.	Define gene: Define allele:

	Define genome:
4.1.3 Define gene mutation.	Define gene mutation: Give an example of a gene mutation.
4.1.4 Explain the consequence of a base substitution mutation in relation to the processes of transcription and translation, using the example of sickle-cell anemia.	Identify the specific mutation that causes sickle-cell anemia. Identify the symptoms of sickle-cell anemia. Explain how the mutation leads to the symptoms of this disease.

4.2 Meiosis

4.2.1 – 4.2.3 Review Physiology study sheet

Assessment Statement	Study Information
4.2.4 Explain that non-disjunction can lead to changes in chromosome number, illustrated by reference to Down syndrome (trisomy 21).	Explain the mechanism of non-disjunction of chromosomes. Be sure to include what stage in meiosis this occurs in.
4.2.5 State that, in karyotyping, chromosomes are arranged in pairs according to their size and structure.	Explain how a karyotype is made.

<p>4.2.6 State that karyotyping is performed using cells collected by chorionic villus sampling or amniocentesis, for pre-natal diagnosis of chromosome abnormalities.</p>	<p>Explain the difference between amniocentesis and chorionic villus sampling.</p>
<p>4.2.7 Analyse a human karyotype to determine gender and whether nondisjunction has occurred.</p>	<div data-bbox="526 464 1256 1003" data-label="Image"> </div> <p>Identify the gender of this individual. _____ Explain how you knew.</p> <p>If this individual has a disorder, circle the chromosome abnormality on the karyotype. Identify and explain the disorder.</p>

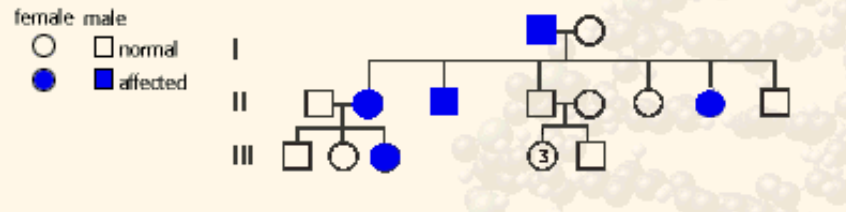
4.3 Theoretical genetics

Assessment Statement	Study Information
<p>4.3.1 Define genotype, phenotype, dominant allele, recessive allele, codominant alleles, locus, homozygous, heterozygous, carrier and test cross.</p>	<p>Define genotype:</p> <p>Define phenotype:</p> <p>Define dominant allele:</p>

	<p>Define recessive allele:</p> <p>Define codominant allele:</p> <p>Define locus:</p> <p>Define homozygous:</p> <p>Define heterozygous:</p> <p>Define carrier:</p> <p>Define test cross:</p>
4.3.2 Determine the genotypes and phenotypes of the offspring of a monohybrid cross using a Punnett grid.	A homozygous dominant black rabbit (BB) is crossed with a heterozygous black rabbit (Bb). Predict the genotype and phenotype ratios using a punnett square.
4.3.3 State that some genes have more than two alleles (multiple alleles).	Some genes have more than two alleles. Explain this using a specific example.
4.3.4 Describe ABO blood groups as an example of codominance and multiple alleles.	<p>Identify which ABO blood group type is an example of codominance. _____</p> <p>Why does it illustrate codominance?</p>

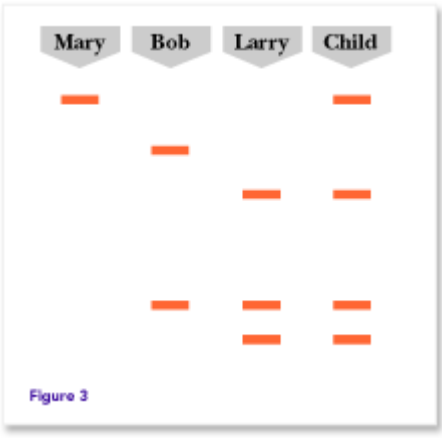
4.3.5 Explain how the sex chromosomes control gender by referring to the inheritance of X and Y chromosomes in humans.	Are X and Y chromosomes homologous? _____ Explain how you know.
4.3.6 State that some genes are present on the X chromosome and absent from the shorter Y chromosome in humans.	What types of genes are found on the Y chromosome?
4.3.7 Define sex linkage.	Define sex linkage:
4.3.8 Describe the inheritance of colour blindness and hemophilia as examples of sex linkage.	<p>State the genotypes of a male and female who have color blindness.</p> <p>State the genotype of someone who is a carrier for hemophilia.</p>
4.3.9 State that a human female can be homozygous or heterozygous with respect to sex-linked genes.	<p>State the genotype of a female homozygous (dominant or recessive) for a sex-linked trait.</p> <p>State the genotype of a female who is heterozygous for a sex-linked trait.</p>
4.3.10 Explain that female carriers are heterozygous for X-linked recessive alleles.	Why can females, but not males, be carriers for sex-linked traits?
4.3.11 Predict the genotypic and phenotypic ratios of offspring of monohybrid crosses involving any of the above patterns of inheritance.	A male with hemophilia has children with a woman who is a carrier of hemophilia. Predict the genotype and phenotype ratios of their offspring using a punnett square.

4.3.12 Deduce the genotypes and phenotypes of individuals in pedigree charts.



4.4 Genetic engineering and biotechnology

Assessment Statements	Study Information
4.4.1 Outline the use of polymerase chain reaction (PCR) to copy and amplify minute quantities of DNA.	Explain how PCR works.
4.4.2 State that, in gel electrophoresis, fragments of DNA move in an electric field and are separated according to their size.	Explain how gel electrophoresis works. (A diagram may be helpful)
4.4.3 State that gel electrophoresis of DNA is used in DNA profiling.	What is DNA profiling (also known as DNA fingerprinting)?

<p>4.4.4 Describe the application of DNA profiling to determine paternity and also in forensic investigations.</p>	<p>How does DNA profiling (DNA fingerprinting) work?</p>
<p>4.4.5 Analyse DNA profiles to draw conclusions about paternity or forensic investigations.</p>	<p>Below are results from a paternity test. According to the test, who is the father of the child (Bob or Larry)? _____</p>  <p>Figure 3</p>
<p>4.4.6 Outline three outcomes of the sequencing of the complete human genome.</p>	<p>Answer the assessment statement.</p>
<p>4.4.7 State that, when genes are transferred between species, the amino acid sequence of polypeptides translated from them is unchanged because the genetic code is universal.</p>	<p>What does it mean that the genetic code is universal?</p>

<p>4.4.12 Outline a technique for cloning using differentiated animal cells.</p>	<p>Outline the steps for cloning a mammal. (A diagram may be helpful)</p>
<p>4.4.13 Discuss the ethical issues of therapeutic cloning in humans.</p>	<p>What is therapeutic cloning in humans? (Hint: It is NOT cloning a full human being)</p> <p>Discuss ethical issues of therapeutic cloning in humans.</p>